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PATENT SPECIFICATION

1,151,119

DRAWINGS ATTACHED.

1,151,119

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Int. Cl.:—A 01 d 57/12.

COMPLETE SPECIFICATION.

Improvements in Retractable Finger Feeding Drums for Crop Harvesting Machines.

We, SPERRY RAND CORPORATION, a Corporation of the State of Delaware, United States of America, of 1290 Avenue of the Americas, New York 19, in the State of New York, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to retractable finger feeding drums of a kind which has been known for some time in the combine, or grain harvesting, art. The aggressiveness of these feeding devices in grain crop harvesters has recently led to attempts at their use on forage, or green crop, harvesters. Contrary to expectations, the retractable finger feeding drum has not proved to be completely satisfactory in handling green cut forage crops. It has exhibited a tendency to become wrapped with crop material, particularly when handling succulent leafy material such as sudan grass or the like. This material has different physical characteristics from those of the dry straw type material commonly encountered in grain harvesting. The wrapping of the drum by green forage crops is initiated by the adherence of material to the slightly protruding ends of the fingers when in their fully retracted or crop release positions. The fingers themselves conventionally protrude through a rocking bearing block held captive at the drum circumference by an external or outer bracket.

If the fingers retract inwards beyond the thickness of the outer bearing block brackets, they may strike the brackets upon re-emergence with resulting damage to the mechanism. If the retracted fingers protrude beyond the surface of the bearing block brackets, as is the custom in the combine or grain feeding devices, the drum will become wrapped when operating on certain green cut forage crops. Thus, the finger ends must be stoped in their most retracted position within the limits of the thickness of the outer bearing block brackets. The manufacturing problems and costs to achieve this precise relationship between the finger ends and the drum is prohibitive because the relationship is affected by an accumulation of the manufacturing tolerances of a large number of preceding elements and sub-assemblies.

The present invention seeks to eliminate the wrapping problems which previously inhibited the successful handling of green cut forage crops with a retractable finger feeding drum. Moreover, it aims at enabling the successful feeding of forage crops with a retractable finger feeding drum with no tightening of the manufacturing tolerances of any of the elements or sub-assemblies over those in effect for the manufacture of similar drums for use in grain crop harvesting operations; and with no increase in the manufacturing cost. To this end, the invention provides that each outer finger guide or bearing block retaining bracket, which is conveniently stamped from sheet material, includes a pair of upstanding flanges dimensioned so as to mask the tip of the associated finger in its fully retracted position. The flanges may be stamped out of portions of the sheet from which the brackets are formed and which were previously cut off and discarded as scrap, and are preferably contoured so as to provide no abrupt projections upon which crop material can adhere.

Advantageously, the flanges project radially from the drum surface so as to enable the outer ends of the retractable fingers to withdraw below the edges of the flanges for positive crop material stripping, while projecting beyond the inner surface of the bear-

[1 .]

ing block retaining bracket. Tighter manufacturing tolerances, and the accompanying increased production cost, are thus rendered unnecessary.

A preferred embodiment f the present invention will now be described, by way of example only, with reference to the accompanying drawings in which:—

Fig. 1 is a fragmentary plan view of a crop consolidating auger and retractable finger feeding drum;

Fig. 2 is a cross-section on the line 2—2 of Fig. 1 but with the drum displaced approximately 90° counter-clockwise from the position shown in Fig. 1;

Fig. 3 is an enlarged fragmentary section on the line 3—3 of Fig. 1;

Fig. 4 is a scrap section on the line 4—4 of Fig. 3;

Fig. 5 is a detailed view of the bearing block retaining clip; and

Fig. 6 is a detailed view of the blank from which the bracket of Fig. 5 is formed.

A major element of forage harvester headers of the kind with which the present invention is concerned is a transversely disposed auger or drum having helical flighting of opposite hand at the respective ends of the auger, and some form of straight rearwardly operating feeding mechanism in the centre of the header to feed rearwardly the crop material that is swept inwardly to the centre of the auger by the outlying flighting. Thus, referring first to Fig. 1 of the drawings, an elongated hollow cylindrical feeding drum or auger 10 has helical flighting 11 and 12 of opposite hand fixed on the outer surface thereof adjacent its respective ends. The central section of the feeding drum is free of flighting and constitutes a feeding drum. The drum 10 rotates about its own central longitudinal axis in the direction of the arrow 14 in Fig. 2, in which also the broken line 15 indicates a plane parallel to the ground over which the forage harvester travels in the direction of the arrow 16.

The crank rod 18 (Fig. 1), is located eccentrically within the cylindrical drum and is supported by crank arms 19 and 20. These in turn are attached to shafts 21 and 22 which are, respectively, journalled in bearings 24 and 25. The bearings are mounted in internal plates, or spiders, 26 and 28 disposed inside the cylindrical drum 10. The shaft 22 projects laterally through the portion of the drum or auger 10 supporting the flighting 11. The outer end of the shaft 22 is rigidly attached to the frame or housing (not shown) of the forage harvester header to prevent the crank from rotating relative to the base frame of the machine. The cylindrical drum 10 rotates about the common axis of the bearings 24 and 25 which are coaxial with the drum in the manner which is conventional in the combine harvester and grain crop feeding art. Four sets of feed fingers 30 have inner ends 31 (Fig. 2) carried by sleeves 32 which ar journalled on the crank rod 18 so that, as cylindrical drum 10 rotates about its own axis with the crank arm 18 held stationary by the anchored end of the shaft 22, the fingers 30 will oscillate and progressively extend and retract relative to the circumference of the drum 10.

The fingers pass through radial apertures 34 (Fig. 3) in the drum 10. Each such aperture accommodates a finger guide or bearing block 35 which is held in place by a pair of slotted retainers or brackets 36 and 38 of generally known form. The inner retainer or bracket 36 has a slot 30 lying in a plane radial to the drum 10 and through which the finger 30 passes. The bearing block 35 is also provided with a diametral hole through which the finger 30 slides, and whilst being retained in the aperture 34 is free to rock about an axis lying in the circumferential wall of the drum. The broad arrangement as so far described operates in known manner.

The bearing block 35 is held captive on the drum 10 by the outer retainer or bracket 38. This bracket has a part-cylindrical central zone 40 contoured to suit the bearing block and generally planar ear portions 41 and 42 at opposite ends. The brackets 36 and 38, and hence the bearing block 35 are held in place on the drum 10 by a pair of studs 44.

The outer bracket 38 is shown in Fig. 5. A central slot 45 is formed in the central zone 40 of the bracket and overlies the aperture 34 in the drum to allow the finger 30 to project through the slot 45. A pair of outturned flanges 46 and 48 are formed integrally with the bracket 38 along the opposite longer sides of the slot 45 and form generally flat part-annular projections on the outer face of the drum 10. The maximum radially outward projection of the flanges occurs at the centre of the slot 45, and diminishes to zero at its ends. When a feed finger 30 is in its innermost or fully retracted position, as illustrated in Figs. 3 and 4, its outer end 50 is withdrawn below the rims of the flanges and as the finger retracts to this position, the flanges 46 and 48 positively strip any crop material from it. The leading and trailing ends of the flanges cannot pick up crop material.

Fig. 6 illustrates a blank from which the bracket 38 of Fig. 5 is stamped. The broken lines 51 and 52 in Fig. 6 indicate the boundaries of portions of material 46^1, 48^1 which are customarily cut out of the blank and discarded as scrap, but which are now bent radially outwards along the lines 51, 52 to form the flanges 46 and 48 in the same single stamping operation for producing the bracket 38.

Due to the cumulative effect of the manufacturing tolerances of the crank assembly and its components; the bearing mounts for the crank and feeding drum, and even the header base frame on which the drum 10 is journalled, it is difficult to predict in any given assembly precisely where the end 50 of a finger 30 will lie, relative to the surface of the drum 10, when the finger is in its fully retracted position. If this outer end retracts below the main body portion 40 of the outer bracket 38, there is a danger that it will strike the edge of the bracket slot when it next emerges. This possibility is readily avoided in the feeding drums for grain crops, or other dry straw-like materials, by simply forming the feed fingers of sufficient length to ensure their remaining proud of the outer surface of the drum 10 under the worst possible conditions of cumulative manufacturing tolerances. This solution, however, is inadequate for feeding drums for forage or green cut crops because the protruding ends of the feed fingers cause the green cut material to wrap around the drum. The sheet from which the outer bearing block bracket is formed, is slightly in excess of one sixteenth of an inch thick. To successfully feed forage crops with the usual retractable feeding finger drum construction, it would be necessary to construct the drum in such a manner that the end 50 of each feed finger 30 would lie within the one sixteenth of an inch space between the inner and outer surfaces of the outer bearing block bracket when the finger 30 is fully retracted. With the bracket of the present invention, the limits within which the end of the feed finger must lie, when fully retracted, extend from the inner surface of the main body portion of the bracket to the radially outermost edges of the flanges 46 and 48. This is a distance approaching one-half inch and is readily achievable with present manufacturing tolerances of the grain crop retractable finger feeding drums. Thus, the modified bracket, alone, converts the grain crop feeding drum for use with forage crops at no increase in the cost of the overall structure. Since the flanged bracket in no way detracts from the ability of the drum to feed grain crops, a single drum construction including the bracket of the present invention, may be used for both grain and forage crops.

Although the invention has been described with reference to the accompanying drawings as being a pair of finger tip masking flanges 46, 48 which are formed integral with the retaining bracket 38 by which the guide block 35 is held captive on the drum 10, it is to be understood that the flanges may be formed separately and secured, either singly or as a pair united by an integral apertured web, directly to the surface of the drum 10. This construction is particularly applicable in the case where no external retaining bracket 38 is used. Where the flanges are secured directly to the surface of the drum 10, their maximum radial height will be sufficient to mask the tip 50 of a finger 30 in its fully retracted position.

Alternatively again, tthe material of the circumferential wall of the drum 10 may itself be deformed radially outwards to provide the masking flanges 46, 48.

Furthermore, although the masking flanges 46, 48 have been described and shown as plane segments of a circle, alternative contours could be adopted if preferred—e.g., segments of an ellipse.

WHAT WE CLAIM IS:—

1. A retractable finger feeding drum for a crop harvesting machine wherein each finger projects through an aperture in the cylindrical surface of the drum, which aperture is flanked by a pair of upstanding flanges of a radial height sufficient to mask the free end of the finger in its inermost retracted position.

2. A feeding drum according to claim 1 wherein the aperture in the drum is a slot to accommodate the angular displacement of a finger during its reciprocation between the extended and retracted positions, and the flanges are plane segments of a circle substantially co-oxtensive with the slot.

3. A feeding drum according to claim 1 or 2 wherein the flanges are formed integral with the external retaining bracket for the conventional rocking guide block through which a finger passes.

4. A retractable finger feeding drum substantially as hereinbefore described with reference to the accompanying drawings.

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Fig. 1.

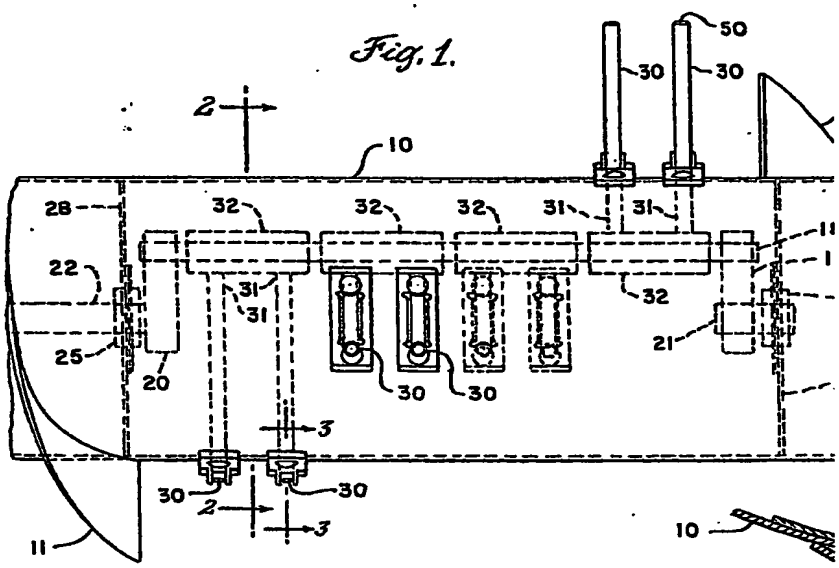


Fig. 2.

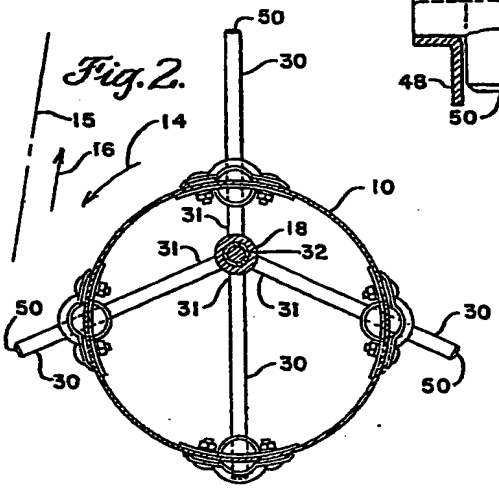
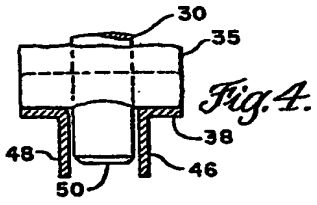
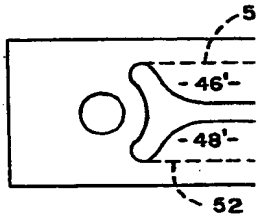


Fig. 4.





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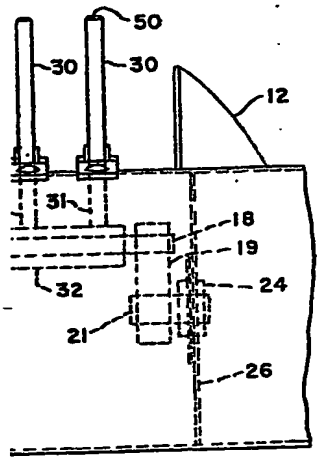
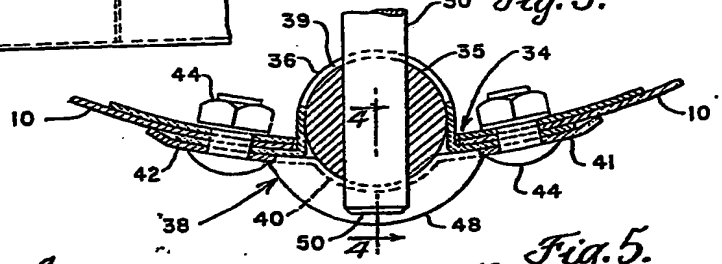


Fig. 3.



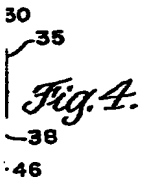


Fig. 4.

Fig. 5.

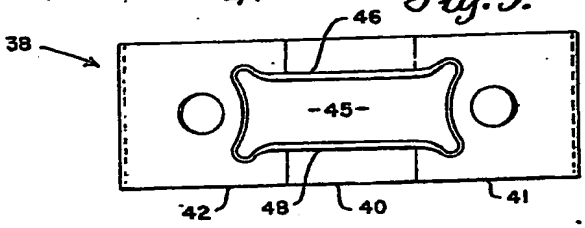


Fig. 6.

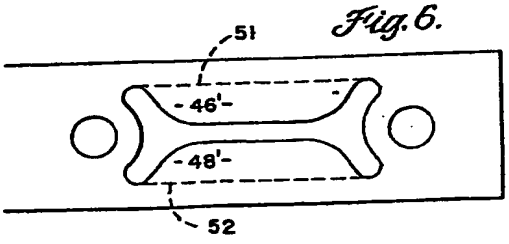


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Fig. 1.

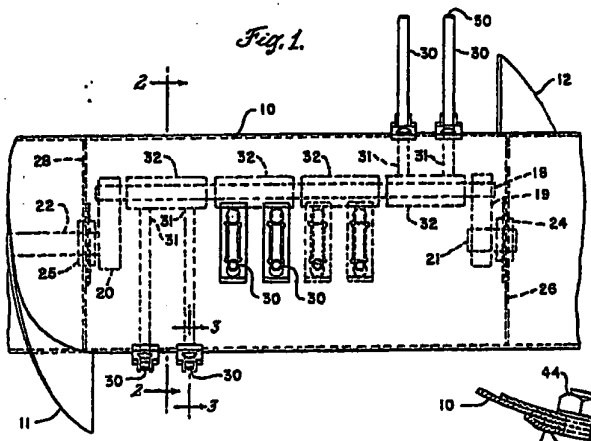

Fig. 3.

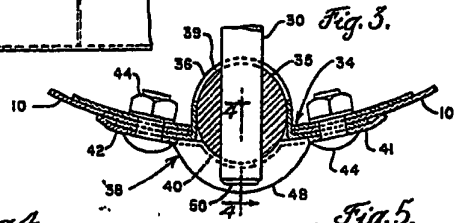

Fig. 4.

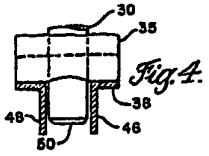

Fig. 2.

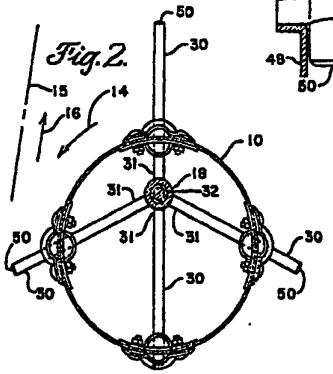

Fig. 5.

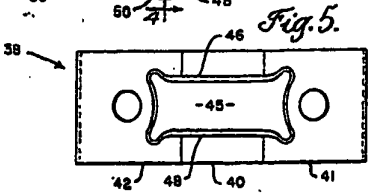

Fig. 6.